

Southeast Asia's emerging energy storage opportunities

Southeast Asia | There has been an uptick in energy storage investment in Southeast Asia, a region still largely powered by coal and experiencing high growth in population and energy demand. Andy Colthorpe speaks with companies working to establish a framework of opportunities in the region.



Image: ACEN

Almost all Southeast Asian countries have experienced a doubling of their GDP since the turn of the millennium and seen their energy demand increase by around 3% every year in that time, according to the International Energy Agency (IEA).

The IEA's 2022 Southeast Asia Energy Outlook reported that under stated policies by the ten countries in the ASEAN region, three-quarters of that increasing demand will be met with fossil fuels, leading to a 35% increase in CO2 emissions.

However, with six of those countries now committed to a future net zero target date, renewable energy buildout is set to accelerate. In a scenario where global warming is restricted to "well below 2°C" within the aims of the Paris Agreement, Southeast Asia countries must deploy around 21GW of renewable energy each year to 2030 and about a quarter of cars sold must be electric vehicles (EVs).

Under that Sustainable Development Scenario (SDS), wind and solar PV reach an 18% share of generation by 2030 and 44%

by 2050. To integrate these higher shares at lowest cost and balance the system flexibly, that could equate to a need for about 45GW of energy storage.

'Very big need for energy storage systems'

"For all of these countries, we see that there is going to be a very big need for energy storage systems," Frederic Carron, VP for the Middle East and Asia region at Wärtsilä Energy.

"Most people have a feeling that yes, energy storage is going to be part of the solution, but they don't know exactly what benefit it is going to provide in terms of emission reduction, plus also in terms of overall system cost benefit."

Wärtsilä has delivered a number of projects in the region, including Singapore's first-ever pilot grid-scale battery energy storage system (BESS) and several large-scale projects in the Philippines, building on the company's existing presence as a provider of flexible engine power plant solutions.

The Philippines' first large-scale solar-plus-storage hybrid (pictured), was commissioned this year.

Wärtsilä is also among the international players to have been awarded projects in Taiwan, not one of the ASEAN countries, but often included in considerations of the Southeast Asia region.

In studies of its own, Wärtsilä modelled the power systems of three key ASEAN countries, the Philippines, Vietnam and Indonesia. Wärtsilä inputs the targeted net zero date as well as the current power generation portfolio in place for a territory in its power system studies.

"The software helps you understand what the optimal power generation assets are to be added to the system by 2050, to at the same time reach the decarbonisation target, plus also at the lowest power system cost," Carron says.

For example, Luzon, the largest and most populous island of the Philippines, would only reach 26% renewable energy by 2030 and 34% by 2040, under a national Power Development Plan. That's far short of the 35% and 50% called for by the Philippines' National Renewable Energy Program 2020-2040. As well as faster build-out of renewable energy, Luzon will need about 6GW of energy storage, according to Wärtsilä's study.

Similarly, the central Indonesian island of Sulawesi, home to the 7% of the country's power demand but about 41% of its power generation capacity – mainly from coal – will need about 20.9GW of renewable energy to meet a government mandate for 51.6% of total electricity generation to come from renewables by 2030. Wärtsilä found that about 14GW of energy storage will likely be needed in Sulawesi.

While Indonesia has set a 2060 net zero target date and the Philippines is yet to introduce one, Vietnam is aiming for 2050. The country has already gone beyond the 20% renewable energy threshold, largely thanks to a solar feed-in tariff that drove about 15GW of instalments from 2020,

equivalent to about three years of typical solar deployment for the whole ASEAN region.

Wärtsilä said in its power system study that Vietnam needs about 7GW of balancing capacity that could be provided by flexible engine power plants by 2030, and about 1GW of energy storage by 2035.

"Because each country has different access, for instance, to natural resources, to fuels, they are starting from different points. But what's interesting to see is in all the three cases, and we can even extrapolate to most of the countries in the world, the path to net zero is always going to be the same," Frederic Carron says, starting with the addition of renewable energy and continuing with the addition of flexibility resources like energy storage, with some reliance on gas or other fuels for balancing in-between.

So how has the market progressed so far? There has been a real "uptick in investments" in the past couple of years, George Garbandic, principal consultant and energy storage lead for DNV in the APAC region, says.

DNV entered the region about eight years ago as an "exploratory presence" and focused on market-making activities. An unknown field at the time, the market lacked investment funds, developers and off-takers making a concerted effort to get into energy storage.

"The real uptick in investments into BESS projects, I'm talking about real commercial projects with solid financial fundamentals, came about three to four years ago and in the last two years, it is going exponentially up," Garbandic says.

It's still not at the same sort of level seen in the US, in Europe, or even in Australia nearby, but year-to-year growth in the market has been "like crazy", he says. Those countries include Vietnam, Thailand, Taiwan, Philippines, Singapore, Malaysia and Indonesia. That growth is distributed quite equally throughout the region, although each country comes from a very different starting point.

Many countries in the region are now realising that decarbonisation goals can't be achieved just by installing more renewable energy capacity, Narsingh Chaudhary, executive VP and managing director for the Asia-Pacific region with Black & Veatch, says.

About two-thirds of power generation in the wider Asian continent comes from coal, but the economics of energy are changing rapidly. The price of coal in

Vietnam for example has risen from about US\$50/MT in Jul 2020 to over US\$400/MT, while following the country's fast buildout of solar, many renewable power plants risk curtailment and generated energy being wasted.

What's missing?

The main market barriers are similar to what was first seen in now more mature energy storage markets – battery storage is a relatively new technology that was never factored in when it came to grid or energy capacity planning in the past.

DNV's George Garbandic says that Hokkaido in Japan, and California or Hawaii in the US are good examples of territories that have introduced energy resource planning that values the role of storage. In Hokkaido, Japan's northern island, new solar PV or wind plants must be developed with a set portion of energy storage per installed megawatt of renewables. The grid was reaching a plateau of hosting capacity for new renewable energy projects, leading regulators to create a framework that would enable more by leveraging energy storage.

"We still need a unifying and a firm grid interconnect norm, which is valid for every single large utility-scale renewable project in Vietnam, in Thailand, in Taiwan, in any one of these countries that has reached the limit for hosting capacity of renewables," Garbandic says.

"Once this is available, then potential investors will look at these new interconnect norms, that will encompass some level of dispatchability of renewables, and based on these norms, they will provide the necessary storage capability within their renewable parks and maintain compliance."

Institutional investors still not ready

A year and a half ago, at the Solar and Storage Finance Asia conference hosted by our publisher Solar Media, Alexander Lenz, CEO of Aquila Capital's APAC business said the industry should be proactive in offering input to regulators and other stakeholders in the region.

With grids in ASEAN countries dispersed around many islands and less interconnected than other parts of the world, energy storage presents an excellent opportunity to keep networks stable while integrating higher shares of solar PV and wind.

However, as Lenz said at the time, under the current regulatory environment energy storage can't generate the revenue streams to give investors certainty, and grid operators in the region need to understand how different storage applications and technologies can benefit their networks.

Aquila Capital invests in sustainable infrastructure including renewable energy on behalf of institutional investors.

"We wish we could say that the permitting and regulatory environment for renewables has massively shifted in the last 12 months, but unfortunately, we are still facing many of the same headwinds we did in ASEAN a year ago – namely a challenging permitting, regulatory and policy environment and now with the added macroeconomic pressures of rising material costs, inflation and supply chain challenges," Alexander Lenz said when approached for comment.

But despite those challenges, Lenz says he has "no doubt" battery storage will be critical to balance the load across grids and handle the intermittency of renew-



A Wärtsilä BESS project in the Philippines, completed last year. Image: Wärtsilä Energy.

able generation and is hopeful this will be the case in the ASEAN region too.

"With a surer picture of the boundary conditions around any investment or project in ASEAN, we would be more than happy to take on the required risk to build the needed battery energy storage capacity across the region," Lenz says.

Versatile technology dictates learning curve

Of course, as mentioned earlier by George Garabandic and seen in the timeline below, there has been growing energy storage activity in the region, despite this reluctance from Aquila Capital and presumably other investors.

In the Philippines, major power generation companies like SMC Global Power are building out large-scale battery storage plants at their thermal generation sites. Batteries can deliver ancillary services, which SMC and other generators are contracted to provide, faster and more precisely than thermal power plants, and they can do it without the associated emissions.

Garabandic says those power companies are in a sort of arms race with each other to increase operational efficiency of their fleets.

"They know that the battery technology is a lot more efficient way to conduct the business of ancillary services. So, it's not about selling the technology to them as a holy grail, it's about the race between themselves to make their assets be more efficient, and to get the edge over the competition."

Whereas in Thailand, Southeast Asia's biggest solar-plus-storage plant to date is being constructed with a 45MW/136.24MWh BESS. In the case of Thailand and Indonesia, neither country has energy markets, so the objective of renewable energy is not to participate in energy markets.

"Asking independent energy producers to do ancillary services in Thailand is not reasonable because they have no such thing as a tariff for ancillary services. However, in their case, the use case for energy storage is in the line of expanding the hosting capacity of the grid for renewables."

It speaks to the versatility of the technology that different countries around Southeast Asia present different market structures all unified by a common thread of aiming to increase efficiency of delivery, improve energy

Key recent Southeast Asia market developments, as reported by Energy-Storage.news:

October 2020: **Singapore's first grid-scale BESS commissioning** announced. Wärtsilä supplied a 2.4MW/2.4MWh BESS in a project supported by the EMA and utility company SP Group. The system participates in the wholesale market, helping to integrate solar onto the grid and reduce peak demand.

November 2021: **Supply contract for Southeast Asia's then-largest BESS** awarded to Sungrow. The solar PV inverter manufacturer is supplying 49MW of solar inverters and 45MW/136.24MWh BESS to renewable energy independent power producer (IPP) Super Energy for a solar-plus-storage project in Thailand.

February 2022: **First large-scale solar-plus-storage project in Philippines is online**, with AC Energy (ACEN), a subsidiary of holding company Ayala Group, inaugurating the 40MW/60MWh BESS pilot at a 120MW solar PV plant. ACEN said the system, in the municipality of Alaminos, Laguna, will be used by the company to evaluate more opportunities to add battery storage to its portfolio.

March 2022: **5MW BESS pilot project in Indonesia** launched by state-owned utility PLN. A Memorandum of Understanding (MoU) was signed with another state-owned group, Indonesia Battery Corporation. The pilot is aligned with PLN's strategy to reduce consumption and use of diesel at its generation sites, the company says.

May 2022: **Taiwan needs 5GW of energy storage by 2025 and 9GW by 2030** to meet renewable energy goals, says Nelson Chang, chairman of Taiwan Cement Corporation (TCC). Speaking at an AGM, Chang discussed how energy storage was an increasingly important pillar of TCC's business strategy as the cement group adjusted to a decarbonising world.

TCC acquired energy storage integrator NHOA from ENGIE in 2018 and has awarded NHOA more than 400MWh of contracts for BESS projects at TCC facilities on Taiwan.

June 2022: **Philippines solar-plus-storage project with 4,500MWh BESS proposed**. Infrastructure group Prime Infra, owned by billionaire Enrique K Razon, is developing a project which would combine between 2,500MW and 3,500MW of PV with 4,000MWh to 4,500MWh of batteries, described as a "model of dependable renewable energy" by the company.

Q2 2022: Philippines power company SMC Global Power **reached the halfway point in its 1,000MW/1,000MWh rollout of BESS** at its thermal power plant sites around the country. According to local news outlets, Ramon Ang, president of SMC parent company San Miguel Corporation, said 500MWh had been deployed, and 700MWh expected by the end of this year.

July 2022: **100MW/100MWh BESS project deal in Taiwan** signed by Fluence. The company's third and largest deal in Taiwan so far, targeted completion date is mid-2023.

"Taiwan has become one of the most active energy storage markets in the Asia Pacific region. The growth momentum of the energy ecosystem is driven by a clear target and objectives for renewable energy and net zero emission set by the local government," Fluence SVP and APAC region president Jan Teichmann says.

Q4 2022, **Region's biggest BESS** scheduled for commissioning as this edition went to press, Q4 2022. Singapore engineering services group Sembcorp is delivering the 200MW/200MWh project on Jurong Island, an energy and industrial park in the nation state.

The project resulted from Accelerating Energy Storage Access for Singapore (ACCESS), a programme launched in 2018 by the Singapore Electricity Market Authority (EMA).

access and add renewable energy capacity, with energy storage as a means to get there.

Black & Veatch's Narsingh Chaudhary highlights the potential for microgrids around Indonesia's and the Philippines' many islands, powered by a combination of solar PV and batteries with some diesel for backup.

Corporates with production facilities in the region too are seeing battery storage microgrids, typically with rooftop solar, as a means to meet their sustainability goals and gain long-term control over energy costs.

However, markets with scalable energy storage opportunities across the region can only come about if regulators embrace it.

Black & Veatch is currently working as owner's engineer on a developer's bid to build a gigawatt-scale solar-plus-storage facility in the Philippines. While regulations in Southeast Asia are not actively holding the industry back, they are also not proactively encouraging it either, Chaudhary says.

So, is it a question of policymakers and regulators in ASEAN countries looking to more mature markets for answers? Unfortunately, says DNV's George Garabandic, that's unlikely.

"Learning from others is wishful thinking, but this is not something that we can generalise in the region. Often, I end up seeing that various jurisdictions prefer to reinvent the wheel themselves," Garabandic says.